

1.0 | What is a Soil?

1.1 | Regolith, Sediment, & Soil

The regolith is unconsolidated (loose) material/particles overlying solid rock. It can be, literally, a dusting to hundreds of feet thick of particles dislodged or partially weathered from the local bedrock and in particle sizes of up to boulders and beyond. For example, all of the loose material on the surface of the moon, from moon dust to large boulders, is regolith. It was produced on a large scale by early volcanism and asteroid/meteorite impacts and locally on a small scale by solar UV and micrometeorite impacts. The Earth has regolith but unlike the moon, under the right conditions, that regolith can develop into sediment (also made up of loose particles) both of which can develop into soil (still made up of loose particles). The key to Earth's

regolith is that it pretty much forms in place by the weathering of some original rock, producing larger, mostly unaltered chunks of the original rock, mixed with chemically altered smaller particles, none of which has moved from their original positions. Such material can become the C horizon of a soil (discussed later). Movement of the material for any reason (blowing wind, running water, moving ice, sliding down a slope) is erosion, which, when the material is deposited somewhere else, converts the regolith into a sediment.

According to the American Heritage® Dictionary of the English Language, 5th Edition, a sediment is "The matter which settles to the bottom of water or any other liquid; settlings; lees; dregs; in geology, detrital material (particles of rock that have been broken down by erosion and weathering from pre-existing rocks) mechanically suspended in or deposited from water; the material

of which the sedimentary rocks are composed." Put simply, a sediment is made up of particles that have been transported (translocated)/eroded from somewhere else by wind, running water, or moving ice or of particles that have precipitated from water such as lime mud. A sediment is a deposit.

Sedimentary particles range in size from the smallest clay particles to silt, sand, gravel, pebbles, cobbles, and even boulders. The composition of the particles can be anything. The Moon has no sediment because it has no wind, water, or moving ice. Mars, however, does because it has experienced erosion from wind, water, and ice, mostly in its early history although its present thin atmosphere can still produce impressive dust storms.

A soil or solum can develop either from bare rock or from sediment through biochemical changes in the parent material over time. Weathering of the rock or

Figure 1. Regolith on the Moon, Mars, and the Earth

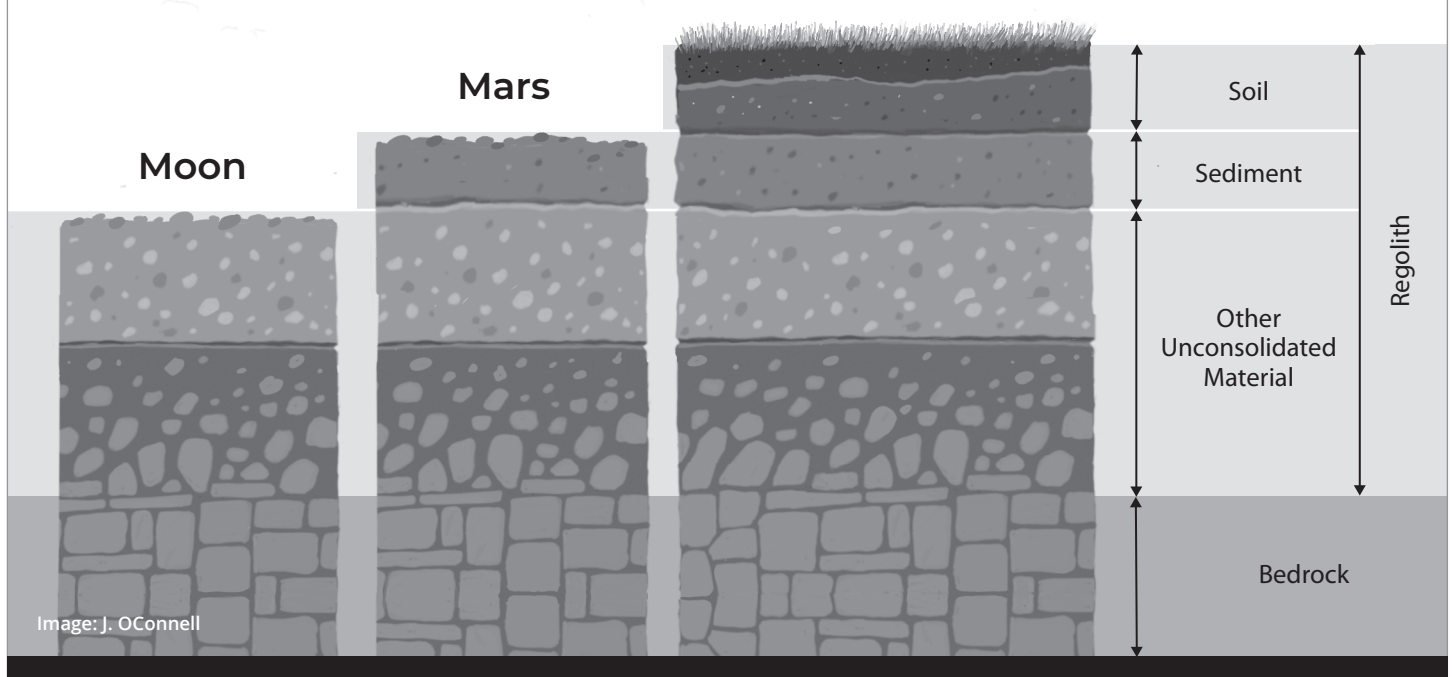


Image: J. O'Connell